NRC NEWS

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Office of Public Affairs Telephone: 301/415-8200

Washington, DC 20555-001 E-mail: opa@nrc.gov

Web Site: http://www.nrc.gov/OPA

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"Getting Past Gridlock"

The Honorable Jeffrey S. Merrifield
Commissioner
U.S. Nuclear Regulatory Commission

at the

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Introduction

As a Nation, we have been facing new challenges about the actions that will be necessary to ensure reliable energy in the future. Today, I will discuss how these issues are affecting our role as a regulator of nuclear power plants now and in the future. As safety is a cornerstone to the efficient operation of our nuclear facilities, I will also discuss several significant issues our agency will grapple with over the upcoming year.

Many of you in the audience may be thinking that ensuring a reliable energy source for the United States is not an issue of concern to the NRC, which is a safety agency. However, when the United States and Canada suffered the largest blackout in history in August 2003, the Commission was drawn into the energy picture in ways that we had not previously seen. As Kierkegaard once said "Life is lived forward, but understood backward." The blackout will undoubtedly shape our future energy picture and consequently influence activities at the NRC well into the future.

The Day the Lights Went Out

All of us have memories of where we were and what we were doing at the time of major news events. The August 14, 2003 blackout is one of those events for me. In addition to being my daughter's birthday, it also happened on a day that Chairman Diaz was away from the office and I was

designated as Acting Chairman. I want to share with you some of the details of that experience to give you an idea about how the NRC reacts to an event of this magnitude.

The day started out relatively normally with our senior staff meeting at 8:30 a.m. As I recall, nothing out of the ordinary was reported. I had a series of meetings and briefings scheduled on various topics throughout the day. One of these topics, coincidently, was electrical grid stability. I had taken an interest in grid stability issues a few years ago and was informally tracking the number of events at the 103 operating nuclear power plants in the United States. At 1:30 p.m. that afternoon I was briefed by Jose Calvo, the Electrical Engineering Branch Chief in the Office of Nuclear Reactor Regulation, about current staff efforts to assess the effects of grid stability on nuclear power plant safety.

Later that same day, at approximately 4:30 p.m., Bill Travers, Executive Director for Operations, walked into my office and reported that there was an electrical grid perturbation in the Northeast and that at least three nuclear power plants were automatically shut down. The reactors tripped off-line due to a complete loss of offsite power. I immediately went to the headquarters Operations Center and joined our Executive Team that was starting to gather. By then, the staff was in a monitoring mode and communicating with our regional offices and affected licensees, while our resident inspectors were on-site monitoring licensee activities.

I soon learned that the blackout was more widespread than originally thought. Information was still coming in, but we now knew that 9 nuclear power plants were shut down as a result of the grid instabilities. These units were FitzPatrick, Ginna, Indian Point Units 2 and 3 and Nine Mile Point Units 1 and 2 in New York; Oyster Creek in New Jersey; Perry in Ohio; and Fermi in Michigan. In addition, Davis-Besse which was already shut down due to an extended outage, had also lost all offsite power. All the plants declared "unusual events" except Oyster Creek, which did not lose offsite power. At the same time, units in Ontario also experienced rapid shutdown.

We learned that the grid disturbances began a little past noontime that day and that between 4:05 and 4:13, the uncontrolled power outages began. The outages raced along the electrical grid and within a few short minutes 50 million people living in 8 states in the U.S. and the Canadian province of Ontario were affected by the blackout.

Our immediate focus following the blackout was to establish effective communications with the plants that had lost off-site power, ensure that the plants had safely shut down and emergency diesel generators were up and running, supplying power to the essential safety systems. This went rather smoothly considering the number of plants involved. All of the 9 plants that tripped as a result of the blackout responded as designed. For those without power, all emergency diesel generators started and supplied power to essential safety equipment. This information was quickly shared with the Chairman, who was in contact with the Operations Center by phone, as well as Commissioner McGaffigan.

Once we established that the plants were in a safe shutdown condition we began notifying external stakeholders. We communicated with members of our Congressional oversight committees, other federal agencies including the Department of Energy, the Federal Energy Regulatory Commission, states as well as members of the public about the number of plants that were shut down and our confidence that they were all in a safe condition. We were also in contact with the Canadian Nuclear Safety Commission (CNSC) to determine the status of their nuclear power plants.

Of course, the Nation wanted assurances that the blackout was not the result of a terrorist act. In a post 9-11 environment, I have to admit that this was the first thing that came to my mind as well. Although terrorist organizations would later claim credit for it, very early in the crisis that rumor was dispelled. Also, that evening press reports stated that the Canadian Defense Minister was asserting that there was a fire at a U.S. nuclear power plant in Pennsylvania that was the catalyst for the blackout. We knew this too was wrong and corrected the misunderstanding.

While we were concerned about our plants shutdown condition, the concerns of President Bush and federal and state officials were focused on getting power back to the critical infrastructure such as hospitals and nursing homes. The news stations were reporting that thousands of people riding mass transit, such as the New York City subway system, were trapped for hours underground. Visitors at amusement parks were left waiting on rides until park employees could walk them off. Elevators were stuck in between floors. Who can forget the scenes of thousands of New Yorkers walking back to their homes from work in lower Manhattan.

As usual, I was impressed with our staff's thorough and expedient thinking that evening. They were quickly adjusting their normal procedures and processes to handle the multitude of plants that had shut down. Typically only one plant is being addressed at a time in the NRC's Operations Center. One example of the staff's critical thinking that evening was to come up with a process to effectively handle the regulatory issues that might arise during restart of the plants. We anticipated that as the licensees began their efforts to bring the plants back on line, there would be requests for enforcement discretion. It is not unusual in severe weather related conditions for a responsible government entity to make an assessment that the need for power and overall public health and safety conditions justify declaring an emergency. In such situations, NRC guidance permits the staff to grant a request to operate outside a regulatory requirement after balancing the health and safety implications of not operating versus operating out of conformance with a particular requirement. Such grants are reported as Notices of Enforcement Discretion (NOED). Because there were so many plants off-line, the staff quickly put together a team in anticipation of multiple NOED requests.

At about 6:30 that evening we had a call with the Homeland Security Council, which included representatives from the Department of Homeland Security, the Federal Energy Regulatory Commission, Department of Energy and the State of New York. As the President would tell reporters in San Diego: "I have been working with federal officials to make sure the response to this situation was quick and thorough, and I believe it has been." For our part I can tell you the response was swift.

By about 8:30 that evening, the situation was stable and the Executive Team determined that it was appropriate to leave the Operations Center with a limited watch.

The Crisis Continued

Early the next morning questions were continuing to be raised about how soon power could be restored. We could appreciate the frustration of our fellow citizens who were sitting in the dark without air conditioning the previous night. Over the past several years we have seen many power outages on the east and west coast due to natural disasters, such as hurricanes and ice storms, but nothing comparable to this outage. I arrived at the office around 7:00 a.m. the next morning and returned to the Operations Center for an 8:00 a.m. briefing with the rest of the Executive Team.

One question asked by those attempting to restore the grid as quickly as possible was: How quickly could the plants be safely brought back on line? As you know, once a nuclear power plant is shut down, an operator cannot just turn a switch back on to get the plant up and running. There are many checks, walk-downs, equipment alignments, and procedures that guide safe restart. Indeed, it would be several days before the plants that shut down as result of the August 2003 blackout were brought back on line. Several plants reconnected to the grid on August 17 while others followed over the next few days. The last plant was reconnected on August 22.

It turned out that only one NOED was necessary. It was granted to allow Ginna to perform mode changes and restart the reactor with one of its auxiliary feedwater (AFW) pumps inoperable.

Governments React

One would think that once the nuclear plants were on line the NRC would no longer be involved in grid reliability issues. However, on August 15 President Bush and Prime Minister Jean Chrétien directed the establishment of a U.S. – Canada Power System Outage Task Force to investigate the causes of the outage and ways to reduce the possibility of outages in the future. They named Spencer Abraham, Secretary of Energy and Herb Dhaliwal, Minister of Natural Resources, Canada to the Task Force. Also appointed to the Task Force were three representatives from Canada and three U.S. representatives. NRC Chairman Nils Diaz and CNSC President and Chief Executive Officer Linda Keen headed up the Nuclear Working Group.

The Task Force divided its work into Phase I and Phase II. Phase I was to determine the cause of the outage and why it was not contained and Phase II was to develop recommendations to reduce the possibility of outages and minimize the scope of any that do occur. The NRC staff has been engaged with the Federal Energy Regulatory Commission (FERC), North American Electric Reliability Council (NERC), Department of Energy (DOE) and our Canadian counterparts during a series of meetings to compile the report.

In November 2003, the Task Force issued the draft of its Phase I report. Its conclusions about nuclear power plants were very positive. Nuclear power plants did not trigger the blackout or contribute to its spread. All the nuclear plants that shut down or disconnected from the grid responded automatically to grid conditions, consistent with plant designs, safety functions were effectively accomplished (all EDGs started and supplied power to essential safety equipment), and the plants were maintained in a safe shutdown condition until their restart. The nuclear portion of Phase II of the report is due out shortly.

Within a month of the U.S. - Canadian outage the blackout issue reached international proportions. On August 28, a blackout occurred in London. Similar to New York, the power outage caused major disruptions in mass transit and a complete loss of power to other aspects of the infrastructure. The BBC reported that Mayor of London Ken Livingstone said that “We’ve never had this catastrophic a failure before and clearly can’t have it again.” Less than a month later Copenhagen, and parts of Sweden were hit by a massive power outage. Approximately, four million homes and businesses lost power. Then on September 28, most of Italy was affected by a blackout of similar proportions.

Grid Stability Is Important

Well before the August 2003 blackout, our staff had been researching the importance of grid stability on safe operation of nuclear power reactors. As many of you know, grid stability is important to reduce the likelihood of a loss of offsite power (LOOP) event that could potentially challenge a plant's ability to remove decay heat. Though plants are designed for these occurrences with back up power supplied by emergency diesel generators, a LOOP event does reduce a plant's safety margin.

There have been numerous grid related events over the years. One particular incident at Callaway Plant, Unit 1 in August 1999 merited considerable attention from the NRC. Due to high temperatures causing stress on the grid near Callaway, for 12 hours the voltage supplied from the grid decreased below the minimal levels called for in Callaway's station procedures. In response to this incident, the licensee undertook a number of plant modifications totaling nearly $40 million including replacing the transformers supplying power to the safety buses and adding capacitor banks to the facility.

The staff studied this event as well as many others and published a comprehensive Assessment, which identified how changes to grid performance could impact operation of nuclear power plants.[1] It found that while the number of blackouts has been reduced over the last 10-15 years, the duration of those blackouts, particularly in the critical peak periods of July and August, has been increasing. The report concludes that while the NRC does not regulate the grid, "the performance of offsite power is a major factor for assessment of risk."[2] The report reinforces the need for nuclear power plant licensees to understand the conditions of the grid throughout the year, but especially in peak periods during July and August. For example, it states that maintaining current levels of safety grid performance is especially important when considering emergency diesel generator maintenance and outage activities for which offsite power is especially important. It also makes a number of assessments that provide substantive guidance for improving plant responses to grid disturbances.[3]

Next Steps

Over the upcoming year the staff should continue to keep its focus on grid reliability issues. There are a number of areas that merit continued attention. One very positive result of the August 2003 blackout was the attention that has been focused on the nuclear power plants. The Task Force has provided the agency a tremendous opportunity to ensure that any changes made by the Federal Energy Regulatory Commission or the North American Electric Reliability Council consider the affect of grid performance on nuclear power plants. The staff must continue to look for opportunities to interact with

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[1] Office of Nuclear Regulatory Research, *Operating Experience Assessment – Effects of Grid Events on Nuclear Power Plant Performance* (NUREG-1784, December 2003).

[2] *Operating Experience Assessment – Effects of Grid Events on Nuclear Power Plant Performance*, p. vi.

[3] For example, *Operating Experience Assessment – Effects of Grid Events on Nuclear Power Plant Performance*, Part 4, Assessment (9), p. 30 discusses how attention to various non-safety related equipment could improve responses to certain grid disturbances.

these organizations to provide support for those activities that may improve grid reliability issues that affect nuclear power plants.

The staff should continue its work on communicating the results of its 2003 Assessment of grid events on plant performance. It has had a number of meetings with industry prior to completing the report, and just last Thursday the Agency held a public meeting to gain further insights about grid reliability and plant performance. The staff should ensure it has adequate resources to complete activities related to grid events in a timely manner. We must continue the momentum that has emerged from the August 2003 blackout.

As I mentioned, grid reliability is an international issue. The staff should continue to look for opportunities to share its insights with our foreign counterparts and learn from their experiences with loss of power events.

One last unexpected positive outcome after the blackout is a closer relationship with the Commissioners at the Federal Energy Regulatory Commission. On January 23, 2004, the two Commissions met to discuss security issues of mutual concern to our agencies. The meeting was closed to allow frank and open discussion of classified security-related issues. We have a mutual desire to have an open public meeting on grid issues in the near future. I look forward to our future interactions and the possibility of providing the public with a better understanding of our agencies' activities in this area.

I now want to turn to other important activities facing the agency in the upcoming year. There are many important initiatives underway at the agency. I think the following are worth highlighting.

Activities for the Upcoming Year

I. The agency has had many successes in the following areas:

A. Power Uprates

Over the years, the NRC has approved 101 power uprates which represent an additional 4200 megawatts electric (MWe) on the electrical grid or an equivalent of about four nuclear power plants. This is an important contribution to our nation's energy security, consistent with maintaining adequate protection of public health and safety. The NRC reviews these applications in a thorough, comprehensive and independent manner. Recently, the staff returned Vermont Yankee's request for a power uprate and issued a letter informing Entergy that the application was incomplete and would not be formally accepted for review. Since then, Entergy has provided additional information and the staff has determined that the application is now acceptable.

In addition to the lessons-learned from the Vermont Yankee application, we must also take note of the unanticipated operational concerns that have recently occurred in some plants operating at these extended power levels. Specifically, the cracking that was found in non-safety related steam dryer parts at Quad Cities and Dresden. The NRC is working closely with the affected licensee and the BWR owners group to ensure the operational concerns and any appropriate regulatory issues are fully addressed. While one can understand the desire of a licensee to maximize the power output from these

operating reactors, we must make sure that these uprates are consistent with our requirement for adequate protection. Given recent outcomes, we need to ensure a rigorous and balanced review.

B. License Renewal

We are consistently completing our licensing action reviews in a timely manner, of which we are justifiably proud. In addition, there continues to be sustained, strong interest in license renewal from industry stakeholders. Some of the highlights of the program's success include consistently meeting or exceeding all scheduled milestones, reducing our original budgeted resources for a single site review by 30%, and a continuing dedication to further improve the efficiency and effectiveness of the license renewal process.

To date we have issued renewed licenses for 23 units at 12 sites and have license renewal applications under review for 19 units at 11 sites. There are challenges for the future of license renewal however, such as establishing a predictable workload for our staff and balancing resources in the reactor program office. In answer to these challenges, the Commission has established a limit of 12 applications under review at any one time. At this time, we do not anticipate any impacts on our review schedules for the near future. Of course, our ability to maintain a smooth review process is highly dependent on the timeliness and quality of application schedules provided by the industry. The better informed we are, the better we can plan our resources accordingly.

C. New Reactor Licensing

The agency is engaged in many aspects of new plant licensing activities. New design certification issues are on the horizon. For those design certifications already in-house the staff is ahead of schedule. The staff is devoting substantial effort to address the remaining draft safety evaluation report open items for the Westinghouse AP 1000, and currently the staff is on track to issue the final safety evaluation report in September 2004, 4 months ahead of the original schedule. The staff is at the pre-application stage with General Electric on their ESBWR and Atomic Energy of Canada on their Advanced CANDU Reactor ACR-700.

In addition to the design certification and pre-application activities, the staff is in the process of reviewing three Early Site Permit (ESP) applications that were submitted last fall. They are Exelon Generating Company for their Clinton site, Dominion Generation for their North Anna site and Entergy for their Grand Gulf site. The Commission recently issued Orders to the Atomic Safety and Licensing Boards conducting the adjudicatory proceedings for these ESP applications, directing the Boards to apply the new Part 2 licensing procedures. The new Part 2 procedures include many changes that are anticipated to make the proceedings more effective and efficient.

The staff is continuing to look at our current regulatory requirements and procedures that will be applicable to new plant licensing to ensure that they are streamlined and consistent with more recent operating history. The staff must continue to resolve these issues to ensure that the agency is fully prepared to review an application should one be received.

II. We must focus our attention and seek improvements in the following areas:

A. Fuel Performance

In the area of fuel performance, great improvements have been made in the last 20 years and the number of fuel failures has steadily declined. Yet, despite these successes, the number of fuel failures in the past two years has noticeably increased, placing fuel issues back on the radar of many plant operators. These failures come at a time when the nuclear industry is focused on improvements in fuel and cladding design, and other changes to support higher fuel burnups, longer operating cycles, and power uprates. The industry must leverage its overall experience and utilize initiatives such as the Electric Power Research Institute (EPRI) Robust Fuel Program to effectively deal with fuel reliability. As a safety regulator, the NRC must be assured that the plants can operate safely under the industry's new performance goals without affecting public health and safety or the environment. Consequently, I think that both the NRC and the industry need to consider additional research to explore new designs and materials that can reverse the recent increase in fuel failures. Clearly, the current trend cannot continue.

B. Fire Protection

Once again I am going to beat a familiar drum. As I said in 2000 - "Clearly, none of our stakeholders - not the public, not our staff, not our licensees, and not Congress - feels good about where we stand in the area of fire protection." Regrettably, I have made the same comments in my 2001 and 2002 Regulatory Information Conference (RIC) speeches and the matter is not resolved. We must come to closure on these issues. Fortunately, there appears to be light at the end of the tunnel. Our effort on the final rule associated with NFPA 805 is nearly complete. The staff must redouble its efforts on this rulemaking to allow licensees to use their own insights to address fire protection issues.

At the same time the staff must resolve the issues associated with operator manual actions in the fire protection area. These issues have lingered far too long. The staff is scheduled to provide the Commission with a proposed rule later this year. I anticipate that this will address the many issues associated with manual actions that have engendered concern on the part of Congress and the public.

At next year's RIC, I hope to report our successes in the fire protection area and silence that drum.

C. Davis-Besse Lessons-Learned Task Force Report

Over the past year the NRC staff has been working on the lessons-learned recommendations from the NRC's self-assessment of the Davis Besse head degradation event. Of the 49 recommendations, 16 recommendations have been completed to date. While significant progress has been made, the staff has learned through its initial development of the associated action plans that some issues will require further examination and much still remains to be completed. In fact, some work extends beyond calendar year 2005.

I am concerned that some of the low and medium priority tasks may get buried in office operating plans and lose the attention they deserve. Looking back historically over other lessons learned efforts, one of the charges made against those in the past is that as a result of an ongoing budget review, some of these items were continuously deferred. We need to ensure that each and every recommendation is appropriately tracked and driven to closure in a timely manner. The staff assures me that these items are getting the appropriate attention and I plan to hold them to it.

III. The Safety Conscious Work Environment initiatives are examples of innovative approaches to old issues:

Last year, the Commission did not approve a staff proposal to develop a rule for the oversight of a safety conscious work environment. The ability of employees to raise regulatory and safety concerns to their management or the NRC, without fear of retaliation, is critical to the nuclear industry's ability to carry out licensed activities safely. Establishing and maintaining a safety conscious work environment to allow this free flow of communication of safety concerns remains the responsibility of our licensees. While the Commission did not approve going forward with a rule, it did approve many recommendations intended to improve the current process.

One of those recommendations was the use of alternative dispute resolution (ADR) in cases of alleged harassment and intimidation (H&I). It has been my impression that many of these H&I cases have resulted from a miscommunication between an employee and his or her management, which could be resolved satisfactorily through ADR prior to and in lieu of an NRC investigation into the matter. ADR has proven to offer a unique approach to resolving these differences. I was pleased that the Commission agreed to direct the staff to develop and implement a pilot program to evaluate the use of ADR in handing allegations or findings of discrimination or other wrongdoing. I understand that you may have heard a little about this pilot program this morning during the breakout session on safety conscious work environment. The Commission should be receiving a proposal from the staff very soon. I look forward to reviewing the staff proposal and moving ahead with the ADR pilot program.

IV. Security will continue to be a focus:

In 2003, we had many accomplishments in the area of security. The most significant effort was the April 2003 Order revising the threat against which individual power reactor licensees and category 1 fuel cycle facilities must be able to defend, commonly referred to as the design basis threat (DBT). I know the NRC staff is working very hard to ensure appropriate guidance is available to the industry to support implementing the requirements of the Order by October 2004. In addition, force-on-force exercises have resumed. We started off with a pilot program in early 2003 and have since moved to a transitional program which factors in the revised DBT. The next step is to make the final transition into a standard force-on-force exercise program and plan to conduct an NRC exercise on each site once every three years. I am looking forward to all of these efforts to collectively come together this year, so we can reach a point of normalization and a more stable security regime. Prior to the terrorist events of September 11, 2001, I spent approximately 5% of my time on security-related issues. Since then, it has increased to about 40%. While the Commission must continue to closely monitor the staff to seek closure on many of the security issues before us, we must ensure that our focus on security does not distract us from important safety and management issues before the Commission.

Conclusion

There are many challenges facing the agency this year. Security cannot continue to consume the significant resources it has over the past two years. We have reached significant milestones in assuring the plants are secure. Having completed those milestones we must focus on safety issues that are not as far along. This is not to suggest that we will not remain focused on security, it is simply to say that it should not consume such a vast amount of our time and resources as it has over the past two years. The U.S. - Canadian Task Force report noted that "[M]odern society has come to depend on

reliable electricity as an essential resource for .... nearly all aspects of modern life." The industry we regulate, producing more than 20% of the nations electric output, plays a significant role in fulfilling those needs. We must continue to participate in efforts to address grid reliability issues that will improve nuclear plant safety and prevent further blackouts. At the same time, we must continue our vigilance to conduct regulatory activities in a manner to assure that the nuclear power plants continue to operate safely.

Thank you for the opportunity to speak with you today.